Advances in laser and synchrotron radiation instrumentation have continuously boosted photoionization studies on low density matter. At the Elettra synchrotron radiation laboratory (Trieste, I) for the last 2 decades, the research activity in the field of atomic, molecular and cluster physics has been centred around the Gas Phase Photoemission beamline [1], where thorough studies of isolated system can be carried out by means of photoionization techniques and inner-shell electron photoionization, even with low density targets such as molecular vapours [2] or clusters [3]. But more recently the interest of the physical chemistry-chemical physics community has been attracted by the opportunity of exploring also the temporal dynamics of isolated systems by means of novel state-of-the-art light ultrafast X-ray radiation and vacuum ultraviolet (XUV) sources. For this purpose two new beamlines capable of delivering fs-XUV photon pulses have been commissioned and opened to Users in the framework of the FERMI Free Electron Laser (FEL) facility [4]: the Low Density Matter beamline at FERMI [5] and CITIUS [6], a state-of-the-art laboratory source, based on laser High Harmonic Generation on rare gases.

I will thus outline research opportunities opened in the field of atomic and molecular physics by these novel ultrafast light sources at Elettra, Trieste. In particular I will discuss recent pump-probe experiments, which on one side are used for characterizing our novel VUV light sources [6-9], and on the other side are also paving the way for thorough investigations of electron dynamics in molecular excited states and for femtochemistry application of ultrafast XUV radiation.

   See also http://www.elettra.eu/elettra-beamlines/gasphase.html  
   See also http://www.elettra.eu/lightsources/fermi/fermi-beamlines/ldm/ldmhome-page.html  
   See also http://www.elettra.eu/lightsources/labs-and-services/citius/citius.html  